Patent Claims

1. An apparatus for exchanging heat, in particular for a vehicle, having:

a) at least one first flow path for a first fluid, which is at least partially delimited by at least one first delimiting element (1);

b) at least one second flow path for a second fluid, which is at least partially delimited by at least one second delimiting element (2);

c) at least one first diffusor space, which is at least partially delimited by at least one third delimiting element (4) and is connected upstream of the first flow path, the first diffusor space being flow-connected to at least one first connection piece (6), through which the first fluid flows into the first diffusor space;

d) at least one second diffusor space, which is at least partially delimited by at least one fourth delimiting element (5) and is connected downstream of the first flow path, the second diffusor space being flow-connected to at least one second connection piece (7), through which the first fluid flows out of the diffusor space;

e) at least one third and one fourth connection piece (8, 9), which are flow-connected to the second flow path and through which the second fluid is fed to and discharged from the second flow path;

f) at least one separating element (3), which substantially prevents the first fluid from entering the second flow path and/or the second fluid from entering the first flow path;

g) the separating element (3) being connected in a sealing manner (10, 11) to the first and second delimiting elements (1, 2), and the third delimiting element (4) being connected in a sealing manner to the first or second delimiting element (2) and/or the separating element (3);

h) exchange of heat taking place between the first fluid and the second fluid,

characterized in that

the sealing connections (10, 11) are cohesive connections,

at least the connections in which the material forming the cohesive join is substantially directly exposed to the flow of the first fluid consisting of a first connecting material, and

connections in which the material which forms the cohesive join is not or not directly exposed to the flow of the first fluid consisting of a second connecting material, and

the compositions of the first and second connecting materials being different than one another.

2. The apparatus for exchanging heat as claimed in claim 1,

characterized in that

the fourth delimiting element (5) is connected in a sealing manner to the first or second delimiting element (2) and/or a further separating element.

3. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first and/or second delimiting elements substantially close off the first and/or second flow path with respect to the environment.

4. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the main direction in which the first delimiting element (1) extends runs substantially parallel to the main direction in which the second delimiting element (2) extends.

5. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first delimiting element (1) is arranged at least partially inside the second delimiting element (2) in particular in the second flow path.

6. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the separating element (3) is a tube plate, and the first and second delimiting elements (1, 2) are each a tube.

7. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first delimiting element (1) is surrounded by the separating element (3) at least in regions, preferably in an end portion.

8. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the separating element (3) is surrounded at least by a subregion of the second delimiting element (2), preferably by an end portion of the second delimiting element (2), or rests against it at the end side, or in that the separating element (3) surrounds at least a subregion of the second delimiting element (2), preferably the end portion of the second delimiting element (2).

9. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the third delimiting element (4) and/or the fourth delimiting element (5) is/are connected in a sealing manner, in particular cohesively, to the first or second connection piece (6, 7).

10. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the third and/or fourth connection piece (8, 9) is connected (15, 16) to the second delimiting element (2) in a sealing manner using the second connecting material.

11. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first fluid is at a higher temperature than the second fluid.

12. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first fluid is a gas, preferably an exhaust gas from a combustion process.

13. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the second fluid is a liquid, preferably a refrigerant, and particularly preferably cooling water.

14. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first connecting material is more resistant to corrosion and/or oxidation than the second connecting material.

15. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the cohesive connection is produced by soldering, preferably brazing, and particularly preferably high-temperature soldering.

16. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the first connecting material is selected from a group consisting of nickel solder (Ni solder), gold solder (Au solder), cobalt solder (Co solder) and the like, in particular further solders which contain alloys of the metals nickel (Ni), silver (Ag), gold (Au) or cobalt (Co), these metals representing a significant constituent of the alloy in question.

17. The apparatus for exchanging heat as claimed in one of the preceding claims,

characterized in that

the second connecting material is selected from a group of materials consisting of copper solder (Cu solder), silver solder (Ag solder), brass solder and the like, in particular further solders which

contain alloys of the metals copper (Cu), zinc (Zn) or silver (Ag), these metals representing a significant constituent of the alloy in question.

18. A process for producing the apparatus for exchanging heat as claimed in one of claims 1 to 17,

characterized in that

a) the components of the heat exchanger, in particular the separating element (3), the delimiting elements (1, 2, 4, 5) and the connection pieces (6, 7, 8, 9), are cohesively connected to one another in a single joining process;

b) the separating element (3) and/or at least one of the delimiting elements (1, 2, 4, 5), prior to the joining process, being provided at least in regions with the first and/or second connecting material; and

c) the separating element (3) and the delimiting elements (1, 2, 4, 5), and also the connection pieces (6, 7, 8, 9), being positively and/or nonpositively connected to one another prior to the joining process and then being fed to the joining process.

19. The process for producing an apparatus for exchanging heat as claimed in claim 18,

characterized in that

the separating element and the delimiting elements, during the joining process, are exposed to a temperature of between 900°C and 1300°C, preferably between 1000°C and 1200°C, particularly

preferably between 1050°C and 1150°C for a predetermined period of time.

20. The process for producing an apparatus for exchanging heat as claimed in either of claims 18 and 19,

characterized in that

the apparatus for exchanging heat, for the purpose of the joining process, is moved through at least one heated zone by means of a conveyor mechanism.

21. The process for producing an apparatus for exchanging heat as claimed in claims 18 to 20,

characterized in that

the joining process takes place under a shielding gas atmosphere, the shielding gas being selected from a group of gases consisting of H_2 (hydrogen gas), N_2 (nitrogen gas), Ar (argon), Kr (krypton), Xe (xenon) and the like, as well as any desired combinations thereof.